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but perhaps the most interesting and fruitful investigation will be to follow still further the line of Mr. Edwards' experiments, and study the proportion of chrysalides of each brood which retain their inmates until spring; noting every instance of the partial retention of the chrysalis, to discover to what extent pupæ, apparently destined to hibernate, disclose the butterfly the same season; and, further, to determine whether both Walshii and Telamonides are indifferently produced from any of the broods of the previous year. Mr. Meldola's studies would lead us to conjecture that Walshii is generally produced from the later broods of Marcellus, and Telamonides from the earlier broods of the same, and from Telamonides and Walshii; but Mr. Edwards' experiments show that this is not invariably the case. The postures of the butterfly have not been described.

THE GAME FALCONS OF NEW ENGLAND.
THE SPARROW HAWK.

BY DR. WILLIAM WOOD.

This beautiful little hawk has the peculiar markings of the true falcon, and is the smallest and handsomest of the family Falconidæ. It is found all over the continent, and is said to be the most numerous of the hawk family. While this no doubt is the fact, yet in New England it is not common. It is about as rare as the pigeon hawk, but not so irregular in its visitations. I have received only ten specimens in twenty years. Allen in his ornithological notes on the birds of the Great Salt Lake Valley says, "The sparrow hawk was by far the most numerous of the Falconidæ. Thirty were seen in the air at one time near the mouth of Weber Cañon engaged in the capture of the 'hateful' grasshopper, which everywhere filled the air and which seemed at this season to form the principal food of this and other birds." In the southern states where it is very numerous it may be seen about the old fields, orchards and gardens, sitting erect on a fence, stake, mullein stalk, or a dead limb of a tree, watching for small birds, mice, grasshoppers or beetles, upon which it chiefly subsists, seldom

committing depredations among the young poultry. When leaving its stand it usually flies low and swiftly, and just before reaching its intended perch rises up with a semicircular sweep, and alights with ease, instantly closing its wings and keeping its balance by the motion of its tail, not using its wings for that purpose, as do most hawks when alighting. They become very much attached to one particular spot and may be seen for weeks and months occupying the same stump or stake. Their flight is usually short and irregular; sometimes hovering for a short time with suspended wings, reconnoitring for prey, and then flying off to another place to renew the same manœuvre. They are easily domesticated. Audubon relates an instance of his taking a young bird and providing it with food until able to hunt for himself, when he let him go. "This proved," says Audubon, "a gratification to both of us. It soon hunted for grasshoppers and other insects, and returning from my walks, I now and then threw up a dead bird high in the air which it never failed to perceive from its stand, and towards which it launched with such quickness as sometimes to catch it before it fell to the ground. To the last he continued kind to me, and never failed to return at night to his favorite roost behind the window shutter. His courageous disposition often amused the family, as he would sail off from his perch and fall on the back of a tame duck which, setting up a loud quack, would waddle off in great alarm with the hawk sticking to her. In attempting to secure a chicken one day, the old hen attacked him with such violence as to cost him his life." When they first appear in the spring, their gyrations and cooings are very amusing. No falling in love at first sight can be more amorous. Audubon has described it so graphically that I venture to quote. "When spring returns, each male bird seeks for its mate, whose coyness is not less innocent than that of the gentle dove. Pursued from place to place, the female at length yields to the importunity of her dear tormentor, when side by side they sail screaming aloud their love notes. With tremulous wings they search for a place in which to deposit their eggs; the birds sit alternately, each feeding the other and watching with silent care. The family resort to the same field, and each chooses his stand, stake or mullein stalk, and together hunt." The sparrow hawk is somewhat dainty, refusing to eat woodpeckers or tainted food, and it is said if it catches a mouse which proves to be lousy and

poor, it will leave it and seek another. It nests in hollow trees, frequently occupying an old woodpecker's hole; sometimes, though rarely, it has occupied an old crow's nest, seldom constructing a nest for itself, laying usually four eggs, of very uniform size. By taking one egg of a set from four sets and three states, I find the measurements as follows:

From Pennsylvania,	long diam.	1·30.	Short diam.	1·12.		
" Maine,	"	"	1·33.	"	"	1·13.
" Connecticut,	"	"	1·30.	"	"	1·13.
"	"		1·38.	"	"	1·15.

The markings are somewhat variable, not any more so, however, than most of the eggs of our hawks. The ground color varies from a cream to a deep buff, blotched with small dark brown or chocolate spots, sometimes quite sparsely, then again almost confluently; occasionally the blotches are quite thick at the large or small end, more commonly the former, and in some instances at both ends with few in the middle. Nuttall claims that this bird "lays from four to five eggs." Dr. Brewer says "its eggs are usually as many as five in number." Audubon says "it lays from five to seven, never less than five." It may in some sections lay that number of eggs, but such has not been my experience in New England, having known of only one set of five taken in this vicinity. One of my collectors found a nest with four eggs in the top of a stump about ten feet from the ground, where it evidently had been broken off by the wind. This nest was composed of grass, and was discovered by the grass protruding through a crack in the stump. Whether the hawk constructed this nest, or whether it had been made by some other bird it is impossible to tell; but, if this hawk constructs no nest as asserted by Dr. Brewer and others, it must have obtained it piratically, as the nest was new. In another instance which occurred in Granby, Conn., the nest was known to have been obtained in this way. A farmer made a dove-house inside of his barn with holes through the sides of the building communicating with it. A pair of doves that had nested there were attacked and killed by a pair of sparrow hawks who took possession of their nest, laid four eggs and commenced to sit. During incubation they found the farmers' chickens very convenient for food—too much so for their own good. Both of the birds I saw after they were killed and their four eggs—two of

which are now in my cabinet. The eggs must have been sat upon several days; hence this was a full set. Samuels collected one set of four in Maine, and says in his ornithology "I am inclined to think from what I can learn from collectors and others, that four is the usual number laid by this bird." It is asserted by Audubon and others that the sparrow hawk raises two broods in a season in the southern states. Not having any personal knowledge of the fact, I wrote to my friend, Dr. S. W. Wilson, of Georgia, who is an experienced ornithologist and oologist, relative to this point. He says, that "the assertion of naturalists that birds south raise more than a single brood in the same season is certainly not applicable to the rapacious birds;" and again he says, "This is my experience after many observations, that none of the hawks and allied birds breed more than once during the same season," they begin nesting in Florida in February; in the middle states, in April; in Connecticut, in the latter part of April and the early part of May; in Maine, in May and June. A lad brought me a female sparrow hawk, April 26, 1871, which he shot on an old dead tree where he had seen it for several days. I inquired if he looked for a nest. "Yes," he replied, "I looked the tree all over and saw no nest on it." I told him to examine the holes in the tree. He returned the next day with two fresh eggs of this hawk. The set was incomplete but would have been full by the 1st of May. There is as much uncertainty about the age when this bird arrives at adult plumage as there is about the pigeon hawk's age — probably, three or more years. I do not know whether they nest before arriving at adult plumage. The hawk taken here with eggs, and the pair from Granby with eggs, were adult birds; these are the only specimens that I have received that I knew positively had nested.

Length, 10 to 12 inches — alar extent, 19 to 23 inches.

"Adult: Frontal band and space including the eyes and throat, white, spot on the neck behind, two others on each side of the neck, and line running downwards from before the eye, black. Spot on the top of the head, the neck behind, black; rump and tail light rufous or cinnamon color. Under parts generally a paler shade of the same rufous as the back, frequently nearly white, but sometimes as dark as the upper parts, and always with more or less numerous circular or oblong spots of black. Quills brownish black, with white bars on their inner webs. Tail tipped with

white, frequently tinged with rufous and with a broad subterminal band of black, outer frequently white, tinged with ashy and barred with black. Bill light blue, legs yellow. Back generally with transverse stripes of black, but frequently with very few or entirely without; rufous spot on the head, variable in size, and sometimes wanting.

Younger male: Upper parts as above; wing coverts and tail ferrugineous red, with numerous transverse bands of brownish black. Under parts with numerous longitudinal stripes, and on the sides with transverse bands of brownish black, external feathers of the tail palest, broad subterminal band on the tail obscure or wanting.

Young: All the rufous parts of the plumage with wider transverse bands of brownish black; wing coverts dark bluish cinereous, with large circular spots of black; under parts with longitudinal stripes, and large circular spots of black."

NATURE'S MEANS OF LIMITING THE NUMBERS OF INSECTS.

BY A. S. PACKARD, JR.

A FEW hints regarding the natural enemies of our injurious insects are here thrown together in order to call the attention of our naturalists and agriculturists to the subject, and provoke inquiries during the coming summer. There is no more interesting subject to our entomologists and ornithologists, than the relations between birds and insects, while the subject of rearing by the wholesale ichneumon and Tachina flies is of vital importance to agriculture.

In the first place I desire to correct a false impression I may have conveyed in my last entomological report to the Massachusetts Board of Agriculture regarding the relation of birds to the canker worm. I there remark that "it would seem as if the birds did not feed upon it to much extent." Wishing to examine into the matter more closely, I have in lack of observations of my